PRK: Postoperative Complications for a SNA

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The Patient

- *25 y/o Caucasian male*
  - *Civilian pilot applicant*
- *Past Medical Hx*
  - *R inguinal hernia repair, age 5*
  - *Benign abdominal soft tissue excision, age 7*
- *Past Ocular Hx*
  - *Myopia*
  - *Astigmatism*

The Patient (cont.)

- *Visits neighborhood recruiter (Sept 2007)*
  - *Told “no way” for Naval pilot training*
- *Elects to have PRK OD/OS at civilian facility*

Preoperative →DQ SNA

Pre-Op Information

Eye: OD	VA-sc:			VA-cc: 20/20
Keratometer:	K1: 44.75 D	K2: 46.75 D		K2 Axis: 104°
Manifest Refraction:	-6.00 DS	-1.75 DC x	11°	12.50 mm
WaveScan® Refraction:	-5.21 DS	-1.70 DC x	13°	12.50 mm
WaveScan® Refraction Pupil Size:	5.50 mm			

Pre-Op Information

Eye: OS	VA-sc:			VA-cc: 20/20
Keratometer:	K1: 44.62 D	K2: 47.25 D		K2 Axis: 90°
Manifest Refraction:	-5.50 DS	-2.25 DC x	173°	12.50 mm
WaveScan® Refraction:	-5.26 DS	-2.14 DC x	2°	12.50 mm
WaveScan® Refraction Pupil Size:	5.50 mm			

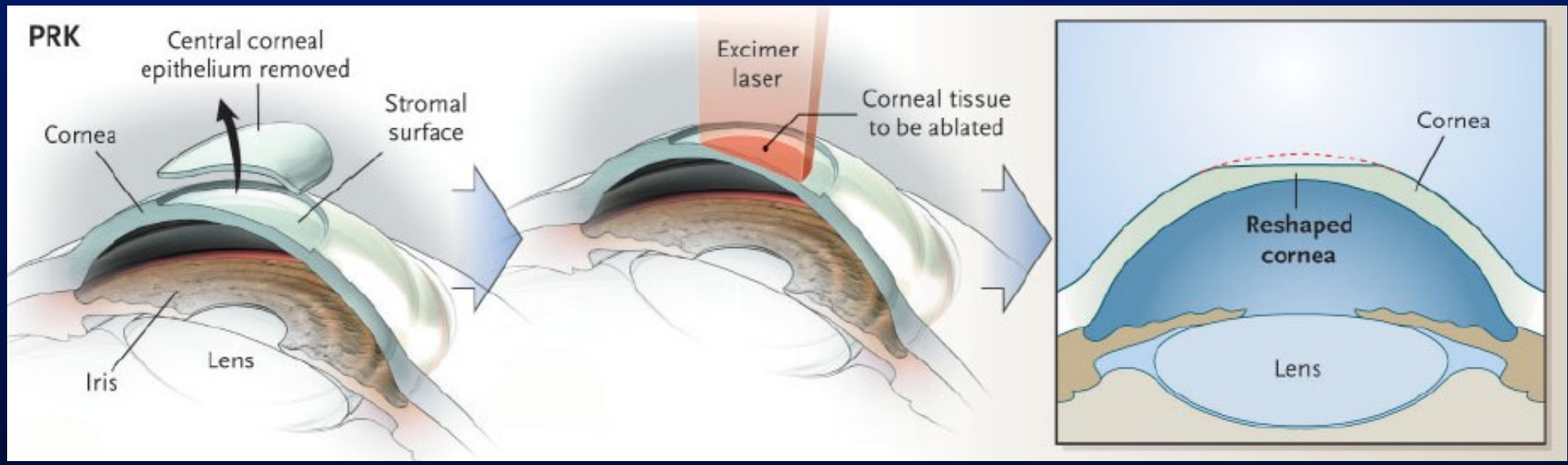
U. S. Navy Aeromedical Reference and Waiver Guide

Revision Date: 6 August 2008

REFRACTION	cyclo/manifest
Total Ref error	+3.00/-1.50
astigmatism	+/-1.00
anisometropia	3.50

Aeromedical Reference and Waiver Guide, NAMI Physical Qualifications Code 42, Aug 2008

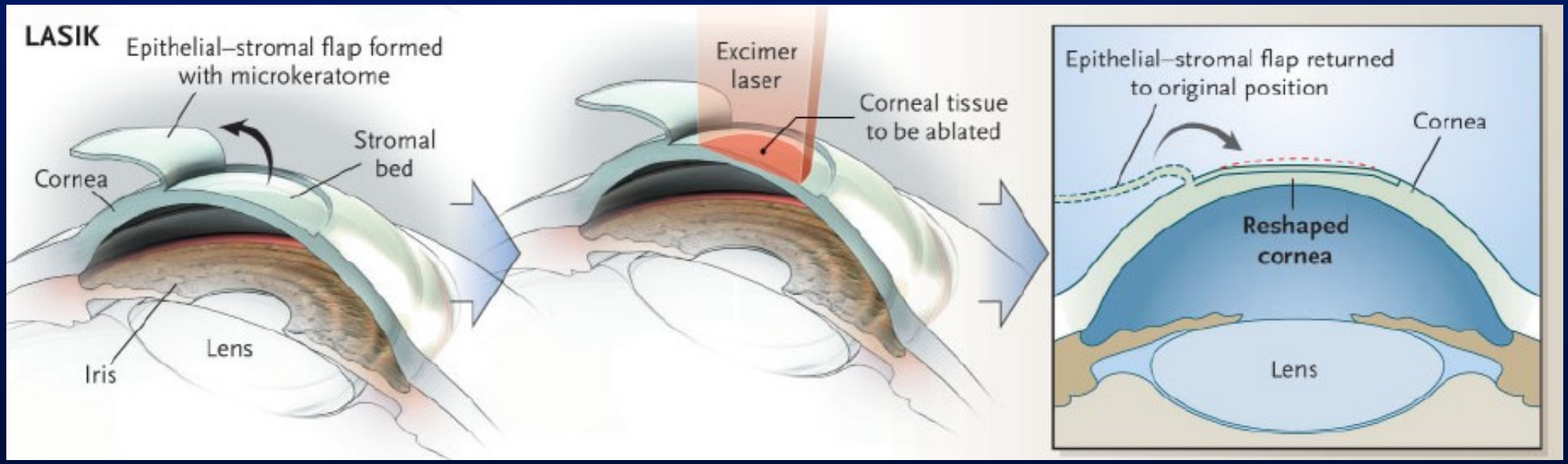
Photorefractive Keratectomy (PRK)



- *First performed 1989; FDA approved 1995*
- *UV excimer laser correction applied to stroma*
- *Epithelial defect heals in approx 3-4 days*

Wilson, S. "Use of Lasers for Vision Correction of Nearsightedness and Farsightedness,"

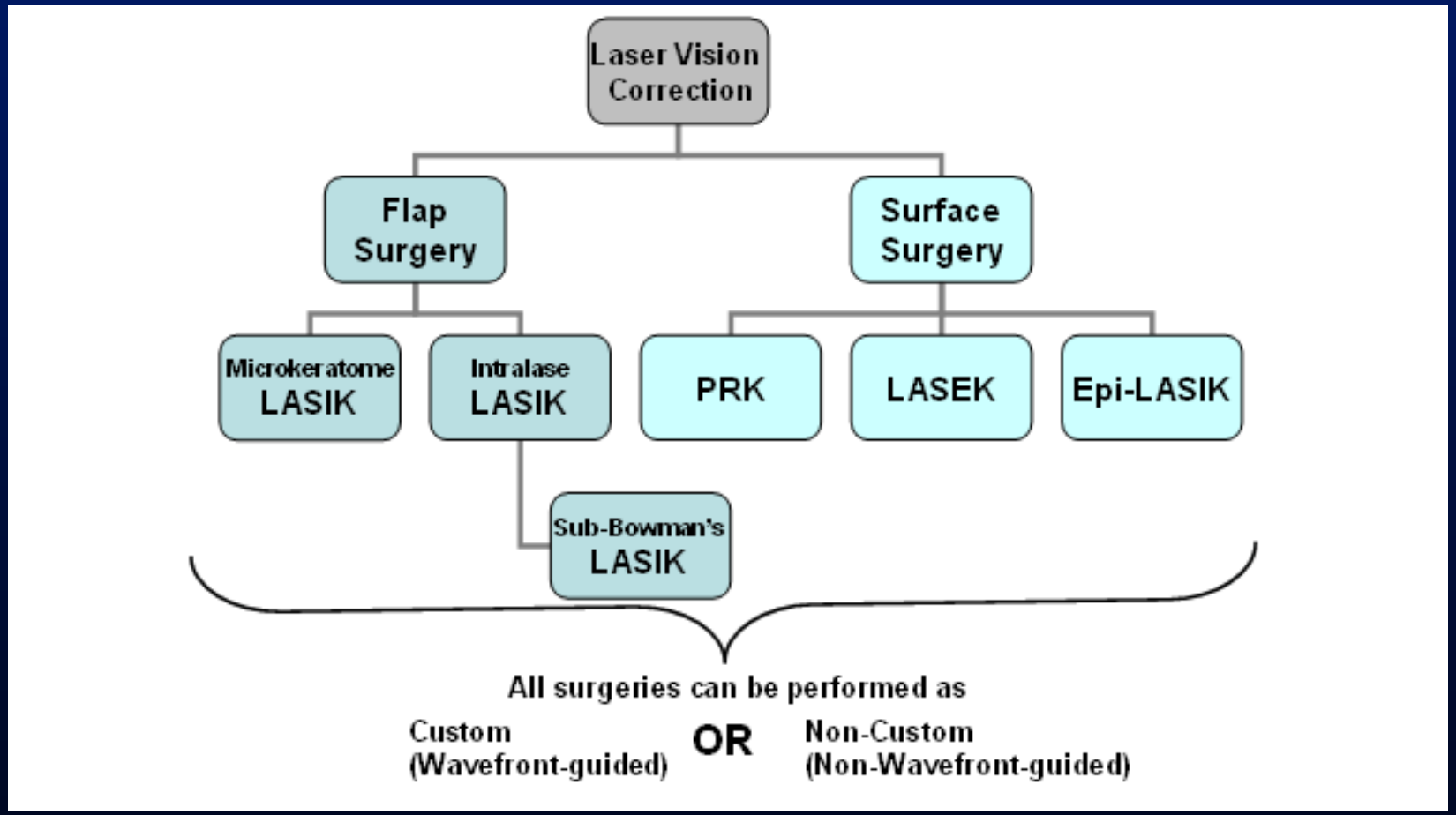
Laser-assisted in-situ Keratomileusis (LASIK)



- *Microkeratome used to create an epithelial-stromal flap*
- *LASEK (subepithelial) is a derivative of PRK*

Wilson, S. "Use of Lasers for Vision Correction of Nearsightedness and Farsightedness,"

Corneal Refractive Surgery (CRS)



http://www.agingeye.net/lasik/lasik.php#

Timeline of Events

- *PRK OD/OS (07 Nov 2007)*
  - *No complications*
  - *Meticulous about post-operative care*
  - *Off all medications/ ocular gtts in 2 mos.*
- *MEPS Physical (Feb 2008)*
  - *20/20 OD/OS, doing well*
- *OCS Newport, RI (12 weeks)*
  - *Began to notice “deterioration” OS*
  - *Episode of uncomplicated acute conjunctivitis at week 10*
- *Waiver submitted (12 May 2008)*

US Navy Aeromedical Policy

PRK:

General guidelines:

1. A waiver may be submitted no earlier than:
    a. 3 months for myopia less than -6.00 diopters spherical equivalent (SE)
    b. 6 months for myopia greater than or equal to -6.00 diopters SE
    c. 6 months for hyperopia (SE) measured under cycloplegia

2. Visual Acuity - each eye with or without corrective lenses must be:
    a. Class I - 20/20-0/10 letters
    b. Class II and III - 20/20-3/10 letters or better
    c. Corrective lenses must be worn while flying if needed to achieve the VA standard
3. A normal postoperative slit lamp exam
4. There must be no symptoms that would be cause for concern when considering the performance of the member's usual flight duties
5. If topical medication is still required (other than artificial tears), then restriction of flight activities to the local area would be prudent.
6. An enhancement or "touch-up" must meet the same guidelines.

Additional guidelines:

Applicants:

1. May obtain PRK at their expense from civilian sources of care.
2. Pre-operative refractive error measured under cycloplegia must not exceed - 8.00 to + 3.00 (SE) and 3.00 diopters of cylinder.
3. Anisometropia should not exceed 3.50 diopters (using SE for each eye).
4. SNA applicants must meet refractive, cycloplegic, and vision standards postoperatively.

CRS: Aeromedical Summary

Surgery performed on **Both Eyes**

Right Eye

Date of Surgery **2007-11-07**	Surgical Center	**Civilian Facility**		Type of Surgery	**Conventional PRK**	
Pre-Operative Cycloplegic Refraction	**-5.50**	**-2.00**	X **009**	Spherical Equivalent	**-6.50**	
Final Post-Operative Manifest Refraction	**+0.75**	**-0.50**	X **074**	Spherical Equivalent	**0.50**	Date **2008-05-12**
Final Post-Op Cycloplegic Refraction	**+1.75**	**-0.50**	X **071**	Spherical Equivalent	**1.50**	Date **2008-05-12**

Left Eye

Date of Surgery **2007-11-07**	Surgical Center	**Civilian Facility**		Type of Surgery	**Conventional PRK**	
Pre-Operative Cycloplegic Refraction	**-5.50**	**-2.00**	X **180**	Spherical Equivalent	**-6.50**	
Final Post-Operative Manifest Refraction	**+1.00**	**-0.50**	X **070**	Spherical Equivalent	**0.75**	Date **2008-05-12**
Final Post-Op Cycloplegic Refraction	**+2.25**	**-0.50**	X **055**	Spherical Equivalent	**2.00**	Date **2008-05-12**

Final Visual Acuity

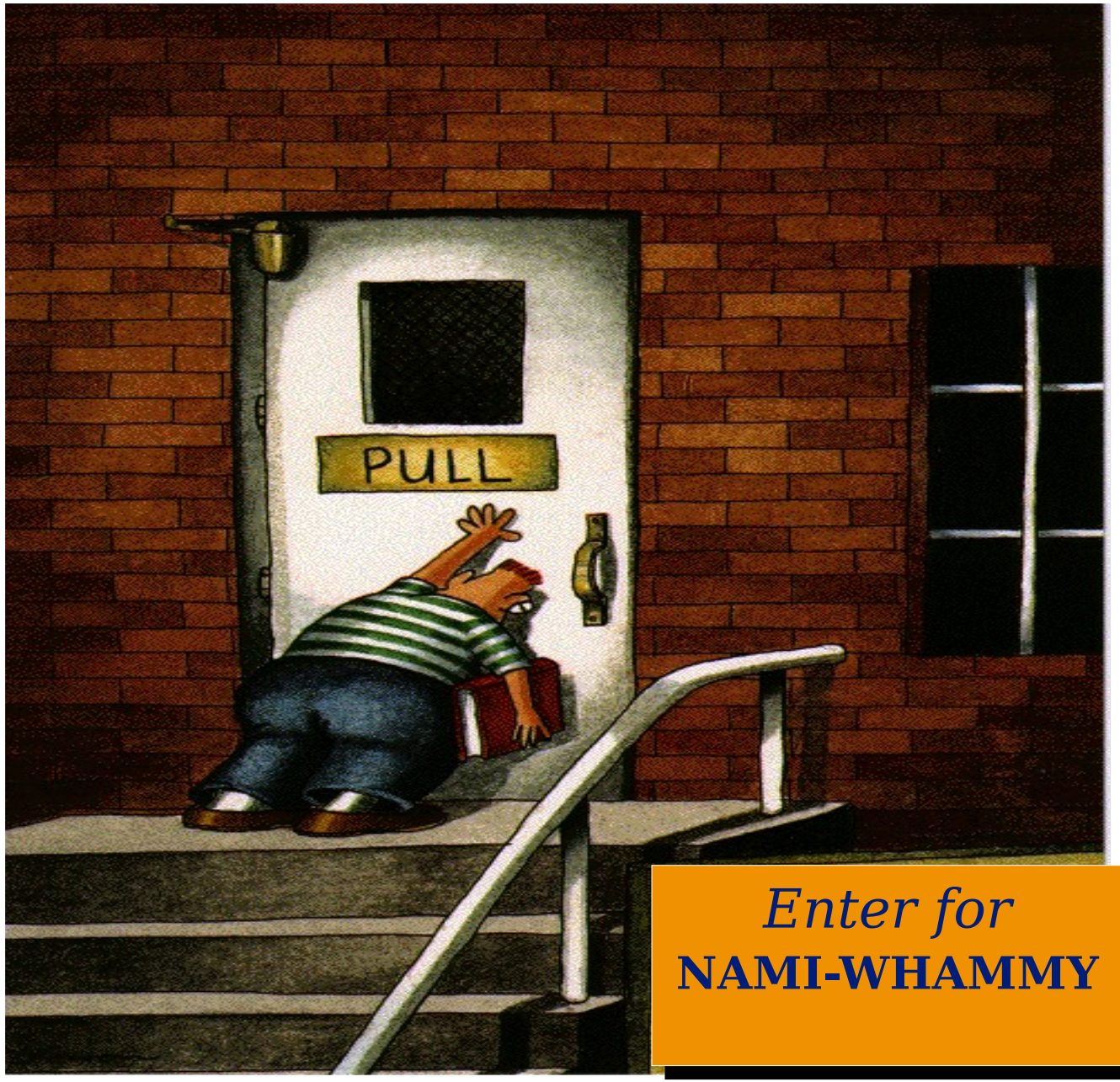
Right Eye Final Uncorrected Visual Acuity	**20/20**	Final Corrected Visual Acuity	**20/20**	Date **2008-05-12**
Left Eye Final Uncorrected Visual Acuity	**20/20**	Final Corrected Visual Acuity	**20/20**	Date **2008-05-12**

☒ Member is asymptomatic with respect to glare or halos from oncoming headlights at night; haze or ghost images; double vision; and vision at twilight. Member is confident in ability to resume or initiate aviation duties.

☒ Member has a normal postoperative slit lamp exam.

☒ Operative report(s) and current flight physical sent to NAMI Code 42 for review.

☒ Member's commanding officer is aware of and concurs with waiver recommendation.



Enter for
NAMI-WHAMMY

Evaluated at NAMI 26 Aug 2008

DISTANT VISION

OD 20/30-0	CORR TO 20/
OS 20/40-0	CORR TO 20/

NEAR VISION

OD 20/20-0	CORR TO 20/
OS 20/20-0	CORR TO 20/

UNCORRECTED DVA MISSES - GOODLITE

		20	30	40		
DATE/INT F.U.	OD	-1	-0			
	OS	-10	-9	-0		
DATE/INT	OD					
	OS					

L	OD		CORR TO 20/	Rx ☐ Frame ____ ADD PD 62 ø 025
	OS		CORR TO 20/	
M	OD	+0.25 -0.50 x 075	CORR TO 20/20-0	Rx ☐ Frame ____ ADD PD ø
	OS	+2.50 -3.50 x 090	CORR TO 20/ 20-0	
C 2008-05-12 DATE	OD	+1.75 -0.50 x 071	CORR TO 20/	FAM OHx - ø P OHx - PRK WR 17 Jun 08
	OS	+2.25 -0.50 x 055	CORR TO 20/	

NCT OD 7
NCT OS 7
T_A OD
T_A OS

Anterior Segment

Lids Lashes	☑ nl OU/ ____
Conj	☑ nl OU/ ____
Cornea	☐ nl OU/ Fibrosis OU
Angles	☑ open OU/ ____
A/C	☑ D&Q OU/ ____
Iris	☑ nl OU/ ____
Lens	☑ clr OU/ ____

Post Segment ☑ Undilated

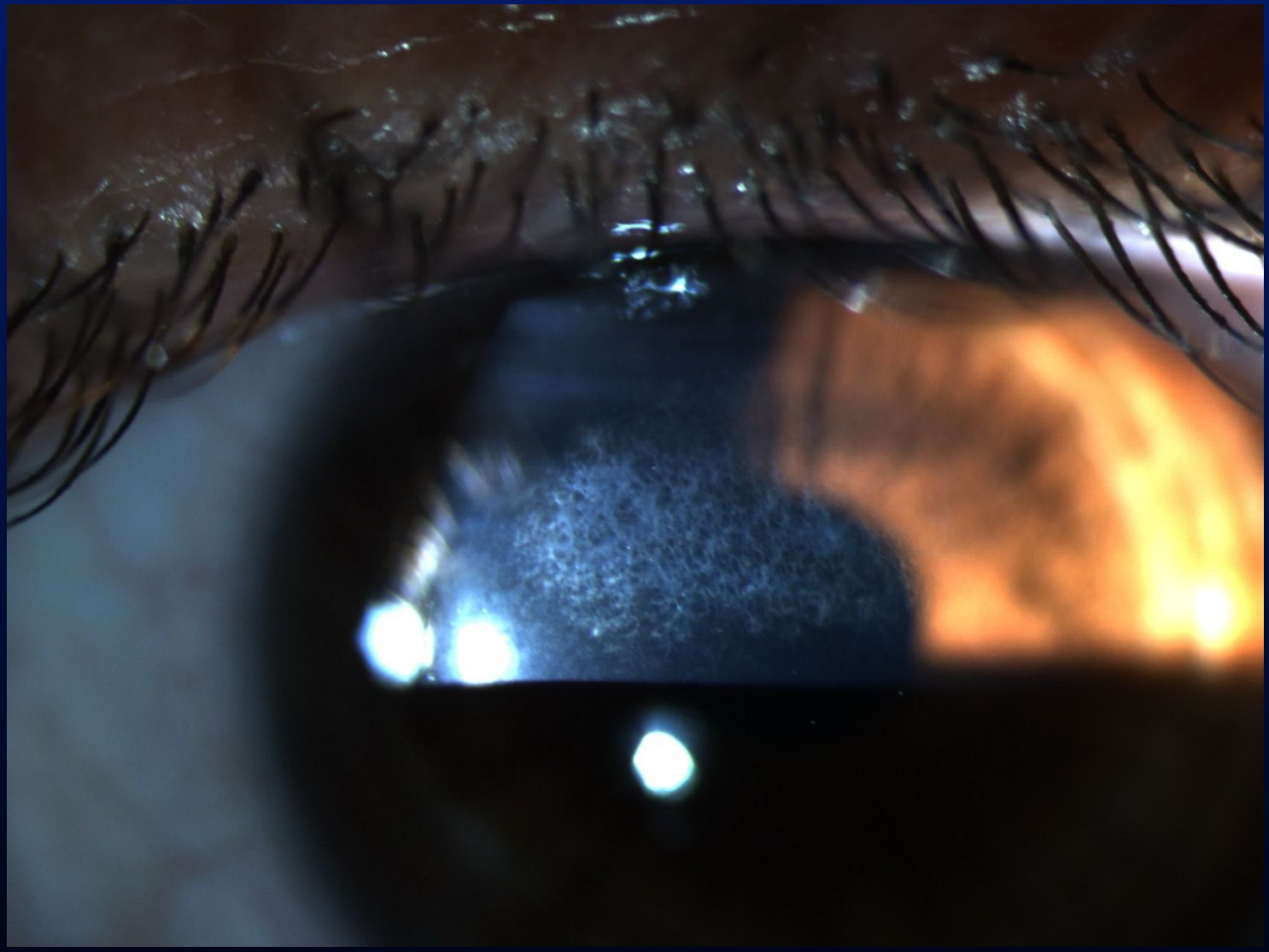
☐ 1% T ☐ 2.5% P ☐ 1% C @ ____

Media	☑ clr OU/ ____
Macula	☑ clr OU/ ____
A/V	☑ clr OU/ ____
FLR	☑ + OU/ ____
C/D	OD .25 OS .25
Margins	☑ clr OU/ ____
Periphery	☐ clr OU/ ____

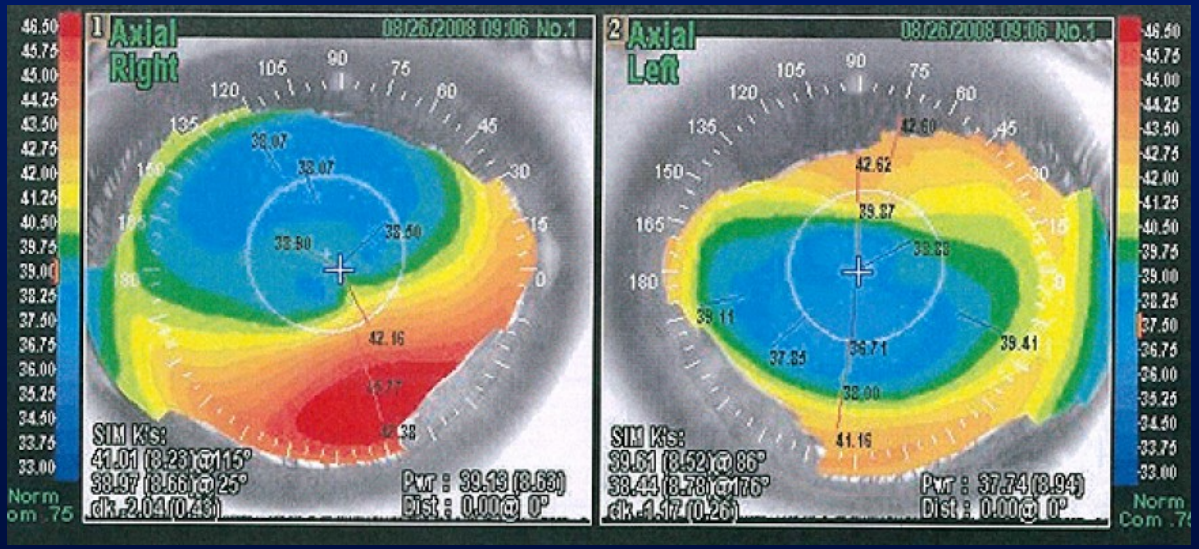
ø Neuro Nobel

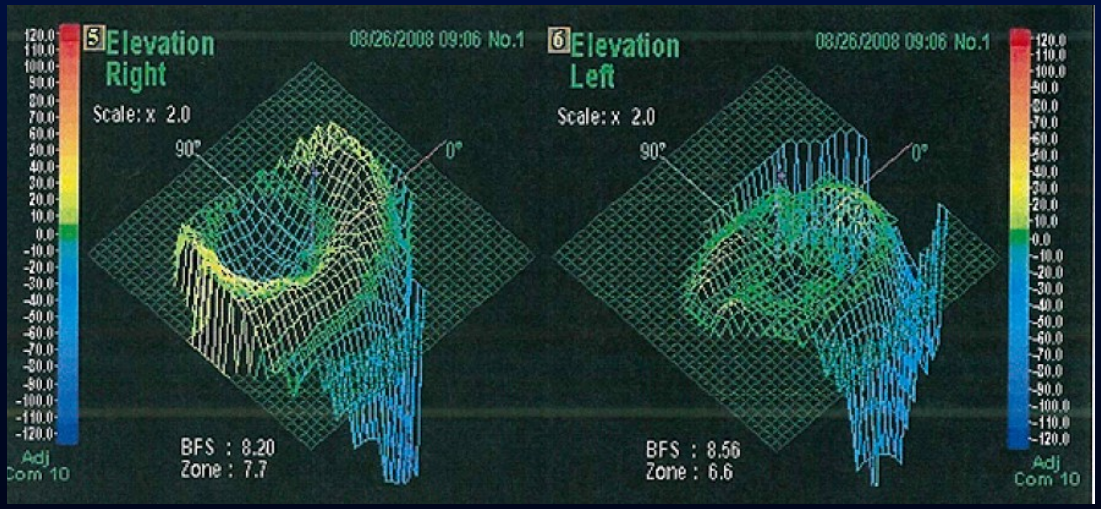
3900 / 41.12 / 090
3850 / 40.12 / 090

Slit Lamp Exam: Grade 2 Corneal Haze



Evaluated at NAMI 26 Aug 2008





CRS Delayed Complications

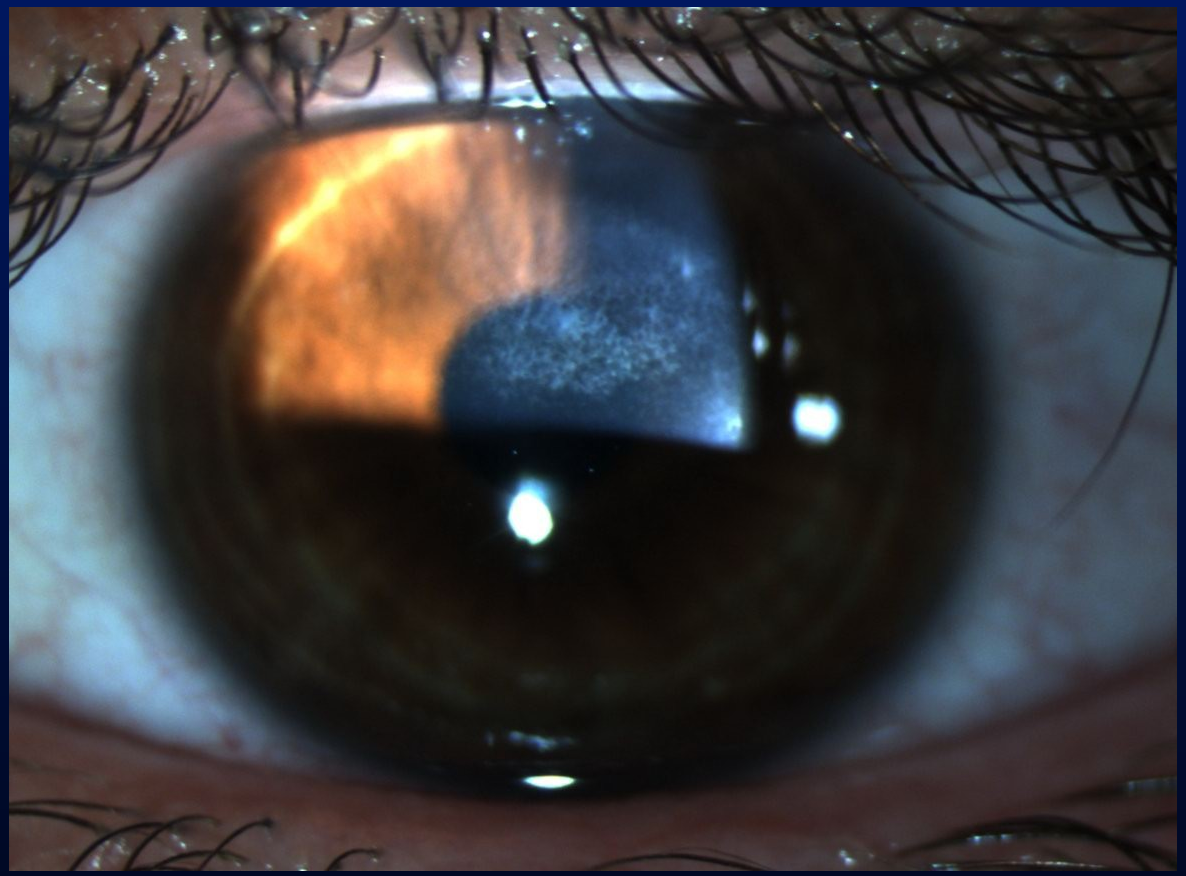
- *Visual disturbances*
  - *Starbursts, halos, distortion*
  - *Decentered ablations*
  - *>7 D myopia or >2 D hyperopia*

    → better screening & eye tracking devi
- *LASIK*
  - *Flap specific issues*
  - *Diffuse lamellar keratitis*
- *PRK*
  - *Stromal haze*

Bower, S, et al. "Overview of Refractive Surgery," *AFP*, 2001.

Wilson, S. "Use of Lasers for Vision Correction of Nearsightedness and Farsightedness,"

Slit Lamp Exam: Corneal Haze



- *Subepithelial fibrosis*
  - *glycosaminoglycans*
  - *type III collagen*
  - *hyaluronic acid and keratin*
- *Etiology is multi-factorial*
- *Lattice structure disrupted with light scatter*

Trattler, W, et al. “Current trends in advanced surface ablation,” *Cur Opin Ophth*, 2008.

PRK: New Developments to Address Haze

- *UV-protective eyewear one-year post-operatively*
- *Antimetabolite mytomycin C (MMC)*
  - *Significant reduction in scarring and ha*
  - *Concerns of corneal melting*
- *Vitamin C*
- *Preservation of the epithelial flap*

Morales, A, et al. “Intraoperative mitomycin and corneal endothelium after photorefractive keratectomy.” *Am J Ophth*, 2006.

Randleman, J, et al. “Outcomes of wavefront-optimized surface ablation,” *Ophthalmology*, 2007.

Trattler, W, et al. “Current trends in advanced surface ablation,” *Cur Opin Ophth*, 2008

Treatment Course

- *Rx steroid regimen (Pred Forte gtts) with taper*
- *Slow improvement in slit lamp haze and VA*

- *After approx 2 mos.*
  - *OD: +0.50 -0.75 x 085*
  - *OS: +2.50 -2.00 x 090*
  - *CVA 20/20 OD/OS*

Improvement: 16 Oct 2008

DISTANT VISION

OD 20/ 20-2	CORR TO 20/
OS 20/ 30° BC	CORR TO 20/

NEAR VISION

OD 20/	CORR TO 20/
OS 20/	CORR TO 20/

UNCORRECTED DVA MISSES - GOODLITE

DATE/INT		20	30	40		
10/16/08	OD					
3mm	OS					
DATE/INT	OD					
	OS					

L	OD	+075 -075 x 085	CORR TO 20/ 20-0	Rx ☐ Frame	NCT OD 11
	OS	+225 -250 x 057	CORR TO 20/ 20-0	ADD PD 800	NCT OS 9
M	OD	+050 -075 x 085	CORR TO 20/ 20-0	Rx ☐ Frame	T_A OD
	OS	+250 -200 x 090	CORR TO 20/ 20-0	ADD PD @	T_A OS
C	OD		CORR TO 20/	FAM OHx	
DATE	OS		CORR TO 20/	P OHx	

Anterior Segment

Lids Lashes	☐ nl OU/
Conj	☐ nl OU/
Cornea	☐ nl OU/ Gr 1-2 Haze OU
Angles	☐ open OU/
A/C	☐ D&Q OU/
Iris	☐ nl OU/
Lens	☐ clr OU/

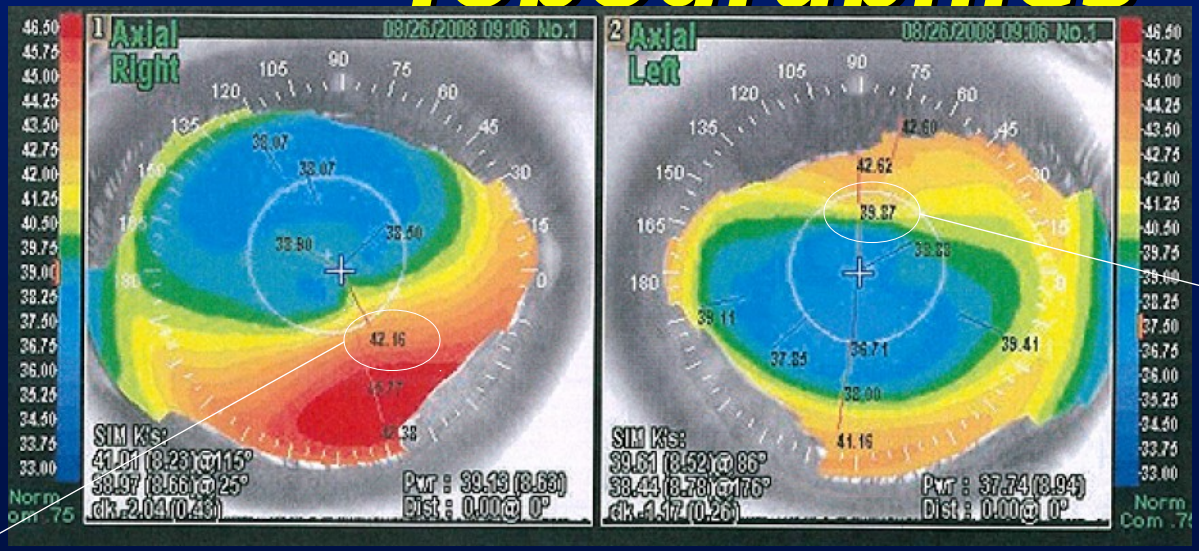
Post Segment ☐ **Undilated**

☐1% T ☐2.5% P ☐1% C @

Media	☐ clr OU/
Macula	☐ clr OU/
A/V	☐ clr OU/
FLR	☐ + OU/
C/D	OD OS
Margins	☐ clr OU/
Periphery	☐ clr OU/

VA is stabilized. Asymptomatic off

Improvement: Topographies



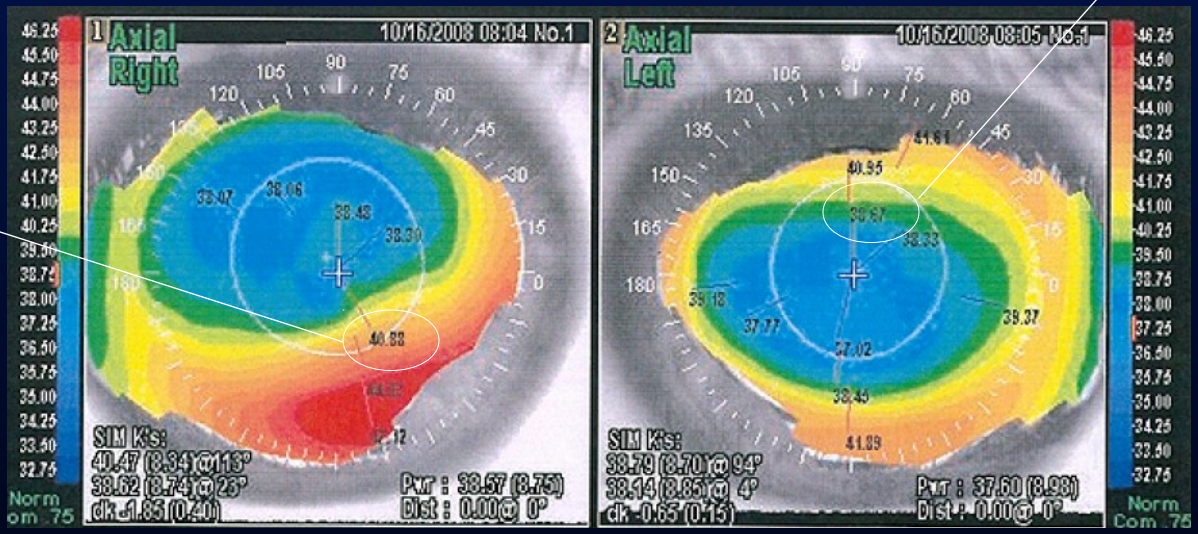
26 Aug

42.16

39.87

38.67

40.88



16 Oct

Take Home Points

- *Corneal refractive surgery*
  - *UV excimer laser to change the refractive power of the cornea*
  - *Safe and effective, outcomes improving with better technology and techniques*

- *Complications are uncommon, but not rare*
  - *Degree of refractive error*
  - *Specific procedure & surgical technique*
  - *Adherence to post-op course*

- *Not without risk—maintain vigilance*

→ *Case Resolution: NPQ-WG, wears corrective lenses, completed IFS & scheduled to begin API this week.*

Questions